

STUDIES IN FRACTIONAL ANALYSES

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JULIUS FRIEDENWALD, W. HORSLEY GANTT AND T. H. MORRISON

*From the Gastro-Enterological Clinic of the Department of Medicine,
University of Maryland, Baltimore, Md.*

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Studies in Fractional Analyses

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SINCE the introduction of the fractional method of gastric analysis, much interest has been manifested in this method of examination and numerous articles have since appeared pointing out the value of this procedure. It was not until the publication of Gorham (1) in 1921 followed closely by that of Bennett (2) Wheelon (3) and Kopeloff (4) that doubt was thrown upon the value of this procedure, due, as it was discovered, to the variations in acidity of the gastric contents when extracted from different parts of the stomach at the same time. It was demonstrated that the stomach contents is not a homogeneous mixture, for, by aspirating the whole of the contents in quantities of 10 cc. in rapid succession, there will be found a variation in the acidity of the various aspirates.

More recently White (5) in a careful research has also demonstrated that the gastric contents removed at the end of an hour is not usually a uniform mixture. The acidity of different fractions taken in rapid succession varied 20 to 30 points or more in 40 per cent of his examinations. The acidity of single fractions taken at that time did not usually represent the acidity of the contents as a whole.

The maximum simultaneous variation in acidity at the end of an hour was 30 points free HCl; 50 points total acidity. The minimum variation was 4 free HCl; 2 total acidity. The average variation was 17 free HCl; 21 total acidity. He arrived at the conclusion, that this variation is not due to the variable position of the tube tip in the stomach as was shown by fluoroscopic observation or as a result of duodenal regurgitation but to a very incomplete mixing of acid secretion with the contents of the stomach.

Lockwood and Jacobson while confirming these conclusions and accepting the fact that the stomach contents is not a homogeneous mixture, point out that the tube tip usually rests near the outlet of the stomach if the subject remains seated or is supine. In consequence, when small amounts are aspirated at regular intervals, the cycle of events as they occur in the *pars media* and *pars pylorica* (the mechanically and chemically active portions of the stomach) are noted.

In our study various problems connected with the fractional method of gastric analysis have been considered.

A. Investigations to determine whether the gastric secretion is a homogeneous mixture.

B. Tests to determine the daily variations in the acidity of the stomach contents.

C. Effect of the tube and metal tip on the production of gastric acidity.

D. Results obtained by means of a "Sippy cure" on the reduction of acidity of the stomach contents in ulcer.

A. Experiments to determine whether the gastric contents is a homogeneous mixture.

The results of our investigations are entirely in accord with those of others already referred to; i.e., in spite of the active peristalsis of the stomach the gastric contents after a test meal is not a homogeneous mixture. The acid must penetrate from without inward and quite often there may be mucous present as well as other substances of varying permeability which prevent the complete admixture of the acid secretion with the contents of the stomach. We have noted that various fractions of the gastric juice when removed and thoroughly mixed in a vessel vary slightly as to acidity, but not nearly to so great a degree as the various specimens of the contents obtained through the tube.

Notwithstanding the fact, that the gastric contents is not a homogeneous mixture, attention must be called to the fact pointed out by Lockwood and Jacobson⁶ that fractional gastric analysis does in most instances give us fairly accurate information regarding the stomach acidity. For the tip of the tube rests near the outlet of the stomach in most instances and in consequence the acidity of the *pars media* and *pylorica*, the active portions of the stomach is obtained.

In our tests (1) the entire contents of the stomach was withdrawn rapidly

at the end of an hour in fractions and the acidity of each fraction determined; (2) by moving the tube from point to point in the stomach and extracting the contents, the acidity of the fluid

TABLE 1

FRACTION	FREE HCl	TOTAL ACIDITY
No. 1		
A.....	60	76
B.....	72	96
C.....	70	80
D.....	70	80
E.....	70	80
F.....	72	62
G.....	74	56
H.....	72	42
I.....	50	60
Average.....	67	68
Maximum variation....	22	56
Minimum variation....	2	2
No. 2		
A.....	0	14
B.....	8	16
C.....	0	12
D.....	0	16
E.....	14	24
F.....	14	22
Average.....	6	17
Maximum variation....	14	12
Minimum variation....	6	2
No. 3		
A.....	30	42
B.....	40	40
C.....	46	56
D.....	50	60
E.....	46	56
F.....	52	64
G.....	40	58
H.....	50	60
I.....	76	90
J.....	40	80
Average.....	47	60
Maximum variation....	46	50
Minimum variation....	2	2

TABLE 1—Continued

FRACTION	FREE HCl	TOTAL ACIDITY
No. 4		
A.....	16	24
B.....	12	20
C.....	14	20
D.....	14	20
E.....	16	22
F.....	16	32
Average.....	15	23
Maximum variation....	4	12
Minimum variation....	2	2

No. 5

A.....	14	20
B.....	12	20
C.....	8	20
D.....	16	20
E.....	10	26
F.....	12	30
Average.....	12	23
Maximum variation....	4	6
Minimum variation....	2	4

No. 6

A.....	8	46
B.....	4	20
C.....	8	20
D.....	8	27
E.....	8	16
F.....	8	16
G.....	8	14
Average.....	7.5	22
Maximum variation....	4	32
Minimum variation....	4	2

No. 7

A.....	12	20
B.....	16	24
C.....	20	24
D.....	20	26
Average.....	17	
Maximum variation....	4	4
Minimum variation....	4	2

TABLE 1—Concluded

FRACTION	FREE HCl	TOTAL ACIDITY
No. 8		
A.....	28	38
B.....	20	36
C.....	24	44
D.....	20	36
E.....	20	40
Average.....	22	39
Maximum variation....	8	8
Minimum variation....	4	2

No. 9

A.....	74	78
B.....	62	68
C.....	56	66
D.....	64	72
E.....	68	74
F.....	46	56
G.....	60	66
H.....	68	74
I.....	74	84
J.....	76	82
Average.....	66	72
Maximum variation....	30	28
Minimum variation....	2	2

removed from various sections was tested; (3) the effect of mixing the stomach contents by rapidly moving the piston of an aspirating syringe to and fro while attached to the Rehfuß tube was determined. The specimens were all removed at the end of an hour in rapid succession, so that but four or five minutes elapsed between the period of removal of the first and last specimen.

The above analyses, taken from 9 cases of our series illustrate the great variations occurring in acidities as determined by fractional analysis, indicating that the gastric contents at the end of an hour after a test meal is

TABLE 2

Results obtained by moving the tube quickly from point to point in the stomach and removing fractions in rapid succession at the end of an hour after a test meal

FRACTION	FREE HCl	TOTAL ACIDITY
No. 10		
A.....	82	100
B.....	85	105
C.....	88	98
D.....	90	100
E.....	62	72
F.....	76	86
G.....	76	84
Average.....	80	92
Maximum variation....	28	33
Minimum variation....	2	2
No. 11		
A.....	54	62
B.....	68	84
C.....	42	56
D.....	58	82
E.....	48	66
F.....	44	78
G.....	44	82
Average.....	51	73
Maximum variation....	26	28
Minimum variation....	2	2
No. 12		
A.....	28	50
B.....	46	68
C.....	32	54
D.....	44	70
E.....	48	68
F.....	54	78
G.....	50	66
Average.....	42	65
Maximum variation....	22	28
Minimum variation....	2	2

not a homogeneous mixture. The maximum variation in free HCl in our series was 46; total acidity 54. The minimum variation was 2 for free HCl and 2 for total acidity.

TABLE 3

Comparative results in the acidities before and after mixing

FRACTION	FREE HCl	TOTAL ACIDITY
Before mixing		
A.....	8	46
B.....	4	20
C.....	8	20
D.....	8	27
E.....	8	16
F.....	8	16
G.....	8	14
Average.....	7.5	22
Maximum variation....	4	32
Minimum variation....	4	2
After mixing		
A.....	8	18
B.....	10	10
C.....	10	16
D.....	10	20
E.....	10	22
F.....	10	20
G.....	10	18
Average.....	9.5	19
Maximum variation....	2	6
Minimum variation....	2	2

Further evidence that the gastric contents is not a homogeneous mixture has been demonstrated: in that in a number of examinations made by moving the tube quickly from point to point in the stomach and removing fractions in rapid succession at the end of an hour marked changes in acidity are also noted. The maximum variation in our series was 28; total acidity 33; the minimum variation was free HCl 2, total acidity 2.

RESULTS OF MIXING OF THE GASTRIC CONTENTS

In these cases in which mixing of contents was performed a 60 cc. syringe was filled by aspiration and driven

forcibly back into the stomach four times. The result was to greatly reduce the variation in acidity. In a series of cases treated according to this plan, one day without mixing and on the following day with the very same precautions and at the same hour after mixing, the maximum variation

TABLE 4

FRACTION	FREE HCl	TOTAL ACIDITY
Before mixing		
A.....	35	48
B.....	48	62
C.....	56	60
D.....	28	52
E.....	46	64
F.....	38	56
G.....	24	44
H.....	50	68
Average.....	40	56
Maximum variation....	32	24
Minimum variation....	2	2
After mixing		
A.....	32	52
B.....	30	56
C.....	32	54
D.....	28	50
E.....	30	56
F.....	34	52
G.....	32	50
H.....	30	50
Average.....	31	52
Maximum variation....	6	6
Minimum variation....	2	2

of free HCl was 32; total acidity 24 before mixing and 16 and 12 after mixing.

FURTHER OBSERVATIONS ON THE
RESULT OF MIXING THE GASTRIC
CONTENTS IN FRACTIONAL ANALYSIS

In 76 cases we extracted a sample as usual with the syringe at the end of

the hour, and immediately obtained a second sample after mixing thoroughly by aspiration according to the method already described.

In 20 cases or 26.3 per cent there appeared to be no variation between the mixed and unmixed specimens and in 28 or 26.8 per cent the acidity

TABLE 5

FRACTION	FREE HCl	TOTAL ACIDITY
Before mixing		
A.....	28	38
B.....	34	46
C.....	36	54
D.....	20	58
E.....	26	50
F.....	38	42
G.....	40	54
H.....	24	50
Average.....	30	40
Maximum variation....	20	20
Minimum variation....	2	2
After mixing		
A.....	28	40
B.....	26	32
C.....	32	42
D.....	30	44
E.....	28	38
F.....	24	32
G.....	30	40
H.....	22	32
Average.....	27	37
Maximum variation....	10	12
Minimum variation....	2	2

of the mixture was higher than that of the stomach contents before mixing; in 28 (36.8 per cent) the acidity was lower. A difference of not more than two was considered as being within the limits of error.

The average variation in acidity in per cent of the total of all cases was free HCl 38.2 and total acidity 22.5

per cent. The average of all 76 cases before mixing was free HCl 22.9 total acidity 37; after mixing free HCl 17.2 total acidity 34.3 showing a lower acidity particularly in the free HCl after mixing.

TABLE 6

FRACTION	FREE HCl	TOTAL ACIDITY
Before mixing		
A.....	38	72
B.....	54	62
C.....	58	68
D.....	46	54
E.....	50	76
F.....	32	68
G.....	48	58
Average.....	46	65
Maximum variation....	26	18
Minimum variation....	2	4
After mixing		
A.....	44	68
B.....	32	60
C.....	30	50
D.....	46	54
E.....	40	58
F.....	34	66
G.....	44	62
Average.....	38	59
Maximum variation....	16	12
Minimum variation....	2	4

DAILY VARIATION IN ACIDITY OF THE GASTRIC SECRETION

In our observations we noted that though there may be daily fluctuations in the acidity of the stomach contents, this variation is moderate and within certain limits, i.e., a hyper-acid, normal or hypoacid secretion continues to present as a rule the same character of acidity. The average variation in acidity following the mixing method practiced under identical

TABLE 7
Presenting the variations in acidity in the gastric contents before and after mixing

CASES	BEFORE MIXING		AFTER MIXING		VARIATION	
	Free acidity	Total acidity	Free acidity	Total acidity	Free acidity	Total acidity
1	0	20	0	20	0	0
2	0	20	0	20	0	0
3	30	38	36	36	4	-2
4	58	70	88	100	30	30
5	14	24	28	36	14	12
6	42	54	34	50	-8	-4
7	20	26	18	24	-2	-2
8	14	22	24	32	10	10
9	0	16	0	20	0	4
10	44	54	40	56	-4	2
11	74	78	62	68	-12	-10
12	0	10	0	14	0	4
13	12	26	20	30	8	4
14	16	24	12	20	-4	-4
15	8	46	8	18	0	-2
16	12	20	16	24	4	4
17	24	38	44	54	20	16
18	30	42	30	42	0	0
19	0	38	20	36	20	-2
20	40	58	60	76	20	18
21	0	16	0	12	0	-4
22	0	16	0	10	0	-6
23	0	10	0	14	0	4
24	0	14	0	8	0	-6
25	0	8	0	4	0	-4
26	0	14	0	4	0	-10
27	0	6	0	6	0	0
28	0	8	0	8	0	0
29	0	10	0	8	0	-2
30	14	24	6	20	-8	-4
31	0	12	2	12	2	-0
32	16	36	10	22	-6	-14
33	46	78	40	54	-6	-24
34	14	34	26	50	12	16
35	0	12	0	14	0	2
36	0	20	0	14	0	-6
37	0	6	0	10	0	4
38	0	20	0	12	0	-8
39	0	10	0	4	0	-6
40	0	8	0	6	0	-2
41	0	8	0	12	0	4
42	0	8	0	6	0	-2
43	0	6	0	6	0	0
44	74	108	66	112	-8	-4

TABLE 7—Concluded

CASES	BEFORE MIXING		AFTER MIXING		VARIATION	
	Free acidity	Total acidity	Free acidity	Total acidity	Free acidity	Total acidity
45	20	28	18	28	-2	0
46	8	26	16	38	8	12
47	24	40	40	90	16	50
48	14	28	22	40	8	12
49	8	28	10	26	2	-2
50	0	12	0	12	0	0
51	0	14	0	20	0	6
52	0	12	0	16	0	4
53	8	14	14	26	6	12
54	0	20	0	14	0	-6
55	0	10	28	44	28	34
56	36	50	38	50	2	0
57	0	22	12	34	12	12
58	20	38	26	42	6	8
59	24	42	26	38	2	-4
60	20	26	26	38	6	12
61	24	44	26	38	2	-6
62	20	36	24	38	4	2
63	20	40	18	34	-2	-6
64	20	40	26	38	6	-2
65	22	38	20	34	-2	-4
66	20	40	28	40	8	0
67	20	40	22	40	2	0
68	24	38	44	54	20	16
69	38	44	24	36	-14	-8
70	48	61	40	50	8	-11
71	46	54	46	54	0	0
72	46	60	38	50	-8	-10
73	4	20	8	18	4	-2
74	8	20	10	16	2	-4
75	8	22	10	20	2	-2
76	8	10	10	22	2	2

conditions in 25 instances showed that there was practically no variation from day to day in 15 per cent. The average variation in 85 per cent of the cases was 7.1 degrees for free acid and 14.3 degrees for total acidity. The results of these findings are in accord with those of Crohn and Reiss (7) and Friedenwald and Morgan (8), who showed that in cases of ulceration, notwithstanding the clinical improvement obtained by treatment, only in about half the number was a decided reduction in acidity obtained.

In but two instances in our series was a change from hyperacidity to achylia noted.

As an illustration the following cases in which the gastric secretion was tested on four occasions according to the mixing method, under identical conditions reveals how slight the daily variations in acidity may be under such precautions; the variations in total acidity at the end of an hour not being more than 10 degrees and free acid 6 degrees; while at the end of two hours the variations in total acidity is not more than 8 degrees; free HCl₄.

THE EFFECT OF THE BULB OF THE REHFUSS TUBE UPON THE SECRETION OF ACID IN THE GASTRIC CONTENTS

Much stress has been placed by those objecting to the fractional method of gastric analysis on the effect of the metal bulb upon the secretion of acid in the stomach.

In 76 instances a comparison was made between the meal withdrawn at the end of an hour with the Ewald tube and Rehfuss tube. These tests were performed under similar conditions and not more than a few days apart. In most cases the deviation was small and within the normal variation which might be expected from day to day.

Forty three per cent of cases showed higher values with the Ewald tube; 42 per cent were higher with the Rehfuss tube and fifteen per cent the results were equal. The average acidity with the Rehfuss tube was free HCl 26.5; acidity 41.5 and with the Ewald test free HCl 25.7; total acidity 42. The presence of the metal bulb has therefore no effect on the secretion of gastric juice.

THE EFFECT OF THE "SIPPY ULCER CURE"
ON THE ACIDITY OF THE GASTRIC
CONTENTS AS TESTED BY MEANS OF
THE MIXING METHOD

Crohn and Reiss (7) have demon-
strated on a large number of observa-
tions that clinical improvement may

improvement was observed in nearly
every instance. The study of Lock-
wood and Chamberlain (9) confirm
these conclusions. In this series of
observations the effect of the "Sippy
treatment" on the gastric acidity was
noted before and a month to six weeks
following this treatment.

TABLE 8
Table presenting the two cases of hyperacidity terminating in an achylia

NUMBER	DATE	MINUTES								
		15	30	45	60	75	90	105	120	
1	8/ 3/21	12	20	30	44	34	70	70	70	Free HCl
		46	24	36	52	58	80	80	80	Total acidity
1	8/15/21	0	0	0	0	0	0	0	0	Free HCl
		20	16	16	18	18	14	12	36	Total acidity
2	8/ 4/21	10	22	38	50	62	60	64	60	Free HCl
	8/ 4/21	28	32	54	68	74	72	78	70	Total acidity
2	8/ 6/21	0	0	0	0	0	0	0	0	Free HCl
	8/ 6/21	16	14	18	22	16	14	20	20	Total acidity

TABLE 9

DATE	MINUTES								
	15	30	45	60	75	90	105	120	
4/ 4/22	10	24	32	34	30	28	30	36	Free HCl
	24	34	38	42	38	42	42	50	Total acidity
4/11/22	18	20	30	32	30	32	30	34	Free HCl
	28	40	36	48	40	40	50	42	Total acidity
4/12/22	14	22	24	30	32	30	36	38	Free HCl
	32	30	38	38	40	42	48	40	Total acidity
4/13/22	14	28	20	28	32	40	30	36	Free HCl
	20	36	32	38	44	48	40	42	Total acidity

take place in cases of ulcer no matter
whether the hyperacidity be reduced
or not, and we (8) have likewise shown
that in 32 instances in which the effect
of the "Sippy cure" on the acidity of the
gastric secretion was noted, that in
but 15 was a decided reduction in
acidity effected even though clinical

In 44 per cent the acidity was higher
after treatment by an average of free
HCl 10; total acidity 14 for the first
hour; free HCl 21 total acidity 18 for
the second hour and free HCl 20 total
acidity 19 for the whole period of the
test. In 22 per cent it was lower after
treatment for the first hour by free

TABLE 10
Effect of bulb of Rehfuuss tube

	REHFUSS TUBE		EWALD TUBE		DIFFERENCE	
	Free HCl	Total acidity	Free HCl	Total acidity	Free HCl	Total acidity
1	60	70	36	64	24	6
2	10	20	26	34	16	14
3	40	52	48	61	8	9
4	26	34	21	47	5	13
5	30	42	12	36	12	6
6	80	88	23	40	57	48
7	28	38	48	56	20	20
8	20	34	24	26	4	8
9	16	30	10	20	6	10
10	72	86	74	84	2	2
11	22	30	30	53	8	23
12	0	16	0	10	0	6
13	36	80	58	87	22	13
14	40	70	47	58	7	12
15	22	34	44	60	22	26
16	0	8	20	24	20	16
17	20	34	0	11	20	23
18	8	18	10	18	2	6
19	40	60	22	34	18	26
20	0	16	0	10	0	6
21	80	88	23	40	57	48
22	22	32	48	56	26	24
23	20	34	24	26	4	8
24	16	30	10	20	6	10
25	20	30	21	47	6	17
26	10	24	18	36	8	12
27	48	60	48	54	0	6
28	48	60	37	54	11	6
29	84	90	60	66	24	24
30	10	20	26	34	16	14
31	40	52	48	61	8	9
32	34	46	25	50	9	4
33	84	112	38	55	46	57
34	14	26	10	55	4	29
35	22	34	16	67	8	37
36	14	22	30	38	16	16
37	40	60	20	35	20	25
38	16	34	33	55	17	21
39	28	36	20	30	8	6
40	0	6	0	6	0	6
41	20	28	22	30	2	2
42	36	48	32	43	4	5
43	0	10	23	30	23	20
44	28	40	37	44	9	4
45	20	28	34	46	14	18
46	16	28	11	25	5	3

TABLE 10—*Concluded*

	REHFUSS TUBE		EWALD TUBE		DIFFERENCE	
	Free HCl	Total acidity	Free HCl	Total acidity	Free HCl	Total acidity
47	60	72	44	56	16	16
48	8	18	22	46	14	28
49	0	6	0	19	0	13
50	18	30	16	44	2	14
51	0	10	0	10	0	0
52	0	6	16	24	16	18
53	10	24	38	54	28	30
54	32	63	10	20	22	43
55	14	24	26	45	12	21
56	2	12	0	11	0	1
57	20	34	35	45	15	11
58	10	20	38	59	28	39
59	28	40	40	80	12	40
60	54	72	39	48	15	24
61	34	44	18	28	16	16
62	2	8	0	20	2	12
63	40	52	49	57	9	5
64	16	28	14	24	2	4
65	34	50	30	50	4	0
66	22	28	13	23	9	5
67	24	44	54	76	30	32
68	80	96	50	70	30	26
69	30	40	9	29	21	11
70	14	30	0	26	14	4
71	20	26	6	24	14	2
72	28	38	20	30	8	8
73	36	54	48	60	12	6
74	54	62	40	54	14	8
75	22	38	10	50	12	12
76	12	56	30	37	18	19
A	26.5	41.5	25.7	42.0		

HCl 18; total acidity 22; for the second hour free HCl 17, total acidity 14; for the whole period of the test free HCl 16 total acidity 14.

In 34 per cent of the cases the effect on the acidity varied irregularly.

It was noted that cases of hyperacidity had slightly more acid after treatment. The average of our cases before treatment was free HCl 26.6 total acidity 38 compared with free HCl 35.9 and total acidity 47.2 after

TABLE 11

AVERAGES	BEFORE TREATMENT		AFTER TREATMENT		VARIATION			
					Higher		Higher	
					Before treatment		After treatment	
	Free HCl	Total acid	Free HCl	Total acid	Free HCl	Total acid	Free HCl	Total acid
1. For first hour.....	13	26	36	46			25	20
For second hour.....	35	48	54	66			19	18
For 11 specimens.....	24	39	49	56			25	17
2. For first hour.....	12	19	16	26			4	7
For second hour.....	28	45	18	28	10	17		
For 9 specimens.....	22	35	16	26	6	9		
3. For first hour.....	54	68	63	79			9	15
For second hour.....	66	80	73	82			7	2
For 8 specimens.....	62	72	68	81			6	9
4. For first hour.....	34	57	13	23	21	34		
For second hour.....	46	70	77	92			31	22
For 8 specimens.....	36	51	66	80			30	29
5. For first hour.....	10	26	16	26			6	0
For second hour.....	10	28	49	57			39	29
For 9 specimens.....	15	30	38	48			23	18
6. For first hour.....	0	5	4	13			4	8
For 4 specimens.....								
7. For first hour.....	32	50	10	23	22	17		
For second hour.....	16	28	21	37			5	9
For 5 specimens.....	28	45	14	33	14	12		
8. For first hour.....	8	17	25	37			17	20
For second hour.....	7	14	32	43			25	29
For 8 specimens.....	9	15	28	41			19	26
9. For first hour.....	27	38	14	23	13	15		
For second hour.....	42	50	18	38	24	12		
For 8 specimens.....	34	47	15	26	19	21		
Average 70 specimens.....	26.6-38		36.9-47.2		18	22	10	14
					17	14	21	18
					17	14	20	19

treatment indicating an average difference of free acidity 9.3 and total acidity 9.2 or of 25.8 per cent and 19.3 per cent respectively.

Table 11 presents the average of the various fractions of gastric contents taken in 9 cases before and after a "Sippy cure" for ulcer.

CONCLUSIONS

1. The stomach contents obtained by means of the ordinary test meal is not a homogeneous mixture in as much as fractions aspirated in rapid succession through the Rehfuß tube reveal a variation in acidity to a greater or less degree. A further evidence of this fact is noted in that by altering the position of the tube quickly from point to point in the stomach, that fractions removed also reveal marked changes in activity.

2. While these variations may be marked they are frequently moderate and in as much as according to Lockwood and Jacobson the tube tip rests near the pylorus in the seated or reclining posture, the cycles of digestion as they occur in the pars media and pylorica are obtained by means of a fractional analysis and therefore

present fairly accurate information regarding the gastric digestion.

3. These variations in acidity may however be largely reduced by mixing the contents and rapidly aspirating and this procedure must from now on be taken advantage of in all examinations requiring accurate information regarding the entire contents.

4. Daily variations in acidity of the gastric contents occurs, but this variation is moderate a hyperacid, normal or hypoacid secretion continues to present as a rule the same character of acidity.

5. The tube itself or the tip has practically no effect on the secretion of acid in the stomach.

6. The acidity of the gastric secretion is not ordinarily influenced by means of the "Sippy treatment" in ulcer even though the patient may show evident clinical improvement.

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